

### **REMARKS/ARGUMENTS**

Reconsideration of this application is requested. Claims 1, 6 and 8-22 remain in the application.

#### **Information Disclosure Statement**

Please see the concurrently filed Information Disclosure Statement citing two US patents that were originally cited in commonly assigned co-pending application Serial No. 11/628,871. The relevant fee has been paid to assure consideration of these two documents.

#### **Claim Amendments**

Claim 1 has been restricted to  $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$  where  $x$  is  $0 < x < 1$  and one or more buffer layers selected from zinc telluride, cadmium telluride and cadmium zinc telluride. The restrictions have respective basis in the Example (see page 17, line 17 to page 21, line 14) and in claim 7.

Claim 1 has also been amended to make it clear that the method is concerned with the fabrication of cadmium mercury telluride (CMT) devices, rather than a CMT growth method *per se*, the method comprising the separate steps of (b) forming a buffered silicon substrate by MBE and (c) growing at least one CMT device layer on the buffered substrate by MOVPE.

Claim 6 has been amended to a preferred substrate orientation, and claims 2-5, 7, 23-29 and 31 to 37 have been cancelled from the application without disclaimer or prejudice.

The Official Action contains seven separate prior art-based rejections. The rejections stated on pages 2 and 3 and 8-12 are no longer relevant by virtue of deletion of the involved claims.

#### **Claim rejections under 35 USC § 102(a)**

Following the restriction of claim 1, it is submitted that objections under USC § 102(a) no longer arise. (Claim 1 is novel, at least, by incorporation of the subject matter of claim 7.)

#### **Claim rejections under 35 USC § 103(a)**

Following the deletion of claims 23-29 and 31-37, objection to those claims under 35 USC § 103(a) no longer arises.

Claim 1 is now directed to a method of fabricating an infrared device comprising a cadmium mercury telluride,  $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$  where  $x$  is  $0 < x < 1$ , device layer, the method comprising the steps of

(a) taking a crystalline silicon substrate,

(b) growing one or more buffer layers selected from zinc telluride, cadmium telluride and cadmium zinc telluride on said substrate by molecular beam epitaxy to form a buffered silicon substrate, and

(c) growing at least one device layer of cadmium mercury telluride on the buffered silicon substrate by metal-organic vapour phase epitaxy.

The claimed invention now requires firstly, that the substrate is silicon; secondly, that the device layer is  $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$  where  $x$  is  $0 < x < 1$  (in other words, the claim now excludes cadmium telluride and mercury telluride device layers); and thirdly, that the buffered substrate comprises one or more layers selected from zinc telluride, cadmium telluride and cadmium zinc telluride. Furthermore, the wording of the claim has been amended to make it clear that the buffered silicon substrate is formed by molecular beam epitaxy (MBE) and a device layer of CMT is then grown on the buffered substrate by metal-organic vapour phase epitaxy (MOVPE). In other words, MBE is used to grow the buffered substrate and MOVPE is used to grow the CMT device layer.

Hence, claim 1 is now directed to a very specific combination of method features that the inventors have found advantageous for producing CMT-based infrared devices.

Nouhi *et al* (Applied Physics Letters, American Institute of Physics, NY, US, Vol. 52, no. 24, 1988-06-13; pages 2028-2030) is concerned broadly with substrates for the growth of  $\text{HgCdTe}$ , and more specifically with an alternative to a bulk  $\text{CdTe}$  substrate. The solution offered by Nouhi *et al* is to use a buffered substrate comprising  $\text{CdTe}$  epitaxially grown on  $\text{GaAs/Si}$ , and the reference goes on to disclose that the  $\text{GaAs}$  epilayers are grown by MBE and the  $\text{CdTe}$  is grown by MOCVD. Hence, the buffered silicon substrate of Nouhi *et al* necessarily comprises  $\text{GaAs}$ , and is grown by a combination of MBE and MOCVD. The reference is silent as to how  $\text{HgCdTe}$  may subsequently be deposited.

Accordingly, Nouhi *et al* differs from the claimed invention in several important respects; it does not disclose the specific buffer layers of the invention, it does not disclose forming a buffered silicon substrate by MBE, and it does not disclose forming cadmium mercury telluride,  $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$  where  $x$  is  $0 < x < 1$ , by MOVPE.

The Examiner has rejected claim 7 (the subject matter of which is now incorporated into claim 1) as unpatentable over Nouhi *et al* in view of Johnson *et al* (Journal of Electronic Materials, Warrendale, PA, US, Vol. 24, no. 5, 1 May 1995; pages 467-473). The Applicant submits, however, that claim 1 as now amended is non-obvious over Nouhi *et al* in combination with Johnson *et al* for at least the following reasons.

The Examiner's reason for stating that claim 7 is obvious over Nouhi *et al* in combination with Johnson *et al* is that Johnson *et al* discloses growing one or more layers chosen from zinc telluride, cadmium telluride and cadmium zinc telluride and hence, it would have been obvious to modify the buffer layer as taught by Nouhi *et al* to incorporate additional buffer layers to maintain the substrate orientation. It is submitted, however, that there is no reason to replace the GaAs/CdTe buffer layers of Nouhi *et al* by the alternative buffer system disclosed in Johnson *et al* and, moreover, Nouhi *et al* teaches away from growing the buffer layers by an all MBE method.

In any case, Johnson *et al* does not teach that a  $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ , where  $x$  is  $0 < x < 1$ , device layer can be deposited by MOVPE, and the benefits thereof. (Johnson teaches CMT growth by liquid phase epitaxy.) Hence, Nouhi *et al* in combination with Johnson *et al* does not arrive at the claimed invention.

In view of the above, applicant submits that claim 1 is patentable over the cited references. Claims 6 and 8-22 are patentable merely by virtue of their respective dependencies; see MPEP §2143.03.

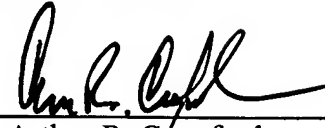
For the above reasons, it is respectfully submitted that claims 1, 6 and 8-22 define patentable subject matter. Reconsideration and allowance are solicited. Should the examiner require further information, please contact the undersigned.

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Respectfully submitted,

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